Caltrans conducted a Value analysis (VA) Study from April to September 2003. Value Analysis studies are required to maintain Federal funding on all projects greater than $25 million on the National Highway Systems. Value Analysis provides an opportunity:

- to build consensus with project stakeholders and partners,
- to provide in-depth analysis and innovative solutions,
- and to reduce cost and maintain project quality.

The VA study for the Hopland Bypass project was conducted to study the project alternatives that will be consistent with the project purpose. The VA Study was intended to focus on alternatives that would validate project purpose and need, analyze staging the project into smaller, more fundable segments, improve project performance and quality and build consensus with stakeholders on segmented alternatives. A risk management study was also incorporated into the VA process. Hulett & Associates, LLC, conducted this study.

The VA team analyzed the project using the Value Analysis tools and job plan. Using function analysis and Function Analysis System Technique (FAST) diagramming, the team defined the basic function of this project as *Compatibilize System (US-101)*. Key secondary functions include *Reduce Congestion*, *Accommodate Traffic Growth*, and *Improve Safety*. Analysis of the functions intended to be performed by the project helped the team focus on the purpose and need of the project and consequently, how to craft alternative concepts that would provide the required functions.

The performance measures tool is used to evaluate the project performance when considering specific criteria that has been defined and weighted by the project stakeholders. These criteria are used throughout the study to evaluate and document alternatives, then ultimately to report overall project performance improvement at the conclusion of the study.

For the VA study, performance criteria were developed in cooperation with the designers and stakeholders. These criteria were weighted, using a paired comparison approach, which resulted in the following criteria that were then used to evaluate ideas and alternative concepts:

- Traffic operations -A measure of the expected level of service for the highway operations of the mainline highway and local streets, including on-ramps and off-ramps), based upon a 20-year projected traffic forecast.

- Highway User safety and pedestrian access - A measure of how the expected accident rate for the project compares with the original concept's expected accident rate, expressed by comparing to the statewide average.

- Access - An approximation of a facility's degree of access (both ingress and egress) between the local roadway infrastructure and the proposed highway system; includes business impacts & the community's objective to create Hopland as a " Destination Town".

- Environmental Impacts - An approximation of the proposed projects' overall effect on the surrounding environment. Environmental factors of highest priority on this project include: Biology, Cultural, Noise, Water Quality, Socio-Economics (not including the access issues – business impacts) and Air Quality

- Floodplain - A measure of the ability to pass floodwaters through the roadway facilities without impacting the roadway facility or the upstream or downstream flow of the drainage facility.

- Schedule - A measure of the total time to complete the project from the present milestone to the end of construction. This is usually measured in months.

- Constructability and phaseability - An approximation of the project's capacity to be built in incremental phases over an extended period of time, while tying into the existing highway system, and/or its capacity to be expanded upon for future phases. Additional considerations include: traffic compatibility, naturally occurring asbestos, balancing cuts and fills, seasonal restrictions.

- Aesthetics - A measure of the following aspects: visibility from the new highway, visual quality of the proposed structures, cuts of the hills and landscaping.

The risk assessment of the alternatives found that the major risk sources associated with all the alternatives were potential Environmental, External (Political, etc.), Regulatory, Technical and Program Management issues.

Seventeen alternatives were developed to improve the project. These alternatives were then compared to a baseline alternative E1 and NHF1 that was obtained from the Project Study Report (PSR). The Baseline alternative (E1 and NHF1) establishes a four-lane, restricted access highway along the foothills to the east of the existing US 101 and connects to existing four-lane portions of US 101 north and south of Hopland. It features three interchanges, and has significant environmental impact.

Nine of the alternatives (Alternatives 1.1A through 1.7) provided alternative ways to bypass the town of Hopland, one alternative (Alternative 2.0) provided an alternative North Hopland project and the remainder dealt with minor modifications to the baseline bypass project (Alternative E1) and staging suggestions that could provide more fundable contracts. The VA team purposely developed a large number of alternatives, in order to increase the breadth of alternative evaluation to be done during the preparation of the draft environmental document. A large number of evaluated alternatives are needed, on a project of this size, to provide the project stakeholders confidence that all viable, major project alternatives were considered.

LIST OF THE VA ALTERNATIVES.

Alternative Number	Alternative Description
1.1A	VE3 Alignment with South Interchange and Grade Separation Over East Side Road
1.1B	VE3 Alignment & Raising of the Route 175 Grade Separation to accommodate Route 175 flooding improvements
1.1C	VE3 Alignment with Route 101/ 175 interchange Easterly Shift
1.2	VE3 with CDF Interchange in lieu of Sundial interchange
1.3	Valley Alternative "East of River" with northerly tie-in near the CDF facility
1.4	Valley Alternatives "West of River" with northerly tie-in near the CDF facility
1.5	E1 Alignment without Route 175 Interchange (Reassign Old Route 101 to Route 175 & develop South Interchange as "Gateway to Hopland")
1.6	VE2 (South) and VE3 (North) with an East Side Road Grade separation
1.7	Span Over East Side Road and Parallel Existing Route
2.0	North Hopland Alternative: Retain Route 101, Build Opposite Direction
3.0	Minor shifts in "E1" Alignment at the South End and near University to reduce imported borrow
4.1	Build E1 & NHF1 in three fundable segments; south to north
4.2	Build E1 & NHF1 in three phases (NHF1, ROW etc, Complete)
4.3	Build E1 & NHF1 in 4 segments (South to North)
4.4	Build E1 & NHF1 in 4 phases (Secure Funding for Right of Way (ROW), first)

5.0	Tie-in Proposals between North Hopland Project and Bypass Project for Valley alignments
6.0	Main Street Concept – Destination Hopland
7.0	Cost to Relocate Hopland CDF Facility
8.0	Modified Route 175 Interchange

CONCLUSION

VA Study

The studied alternatives have varying degrees of impact on Hopland, the surrounding community, the regional goals, as well as cost and schedule. Approximately 32% of the estimated project costs is for structures, 18% for earthwork and 11% for right of way. Rising costs for right of acquisition can be expected over the duration of the project's development.

The change in performance of all the selected alternatives ranged from -10% to +5%. Potential savings ranged from an increase in cost by $48 million to a saving of $73 million. The greatest saving of $73 million was realized for alternative 1.6 -VE2 (South) and VE3 (North) with an East side Road grade separation for a 5% loss of performance. A maximum cost increase of $48 million for a performance change of +5% was found for Alternative 1.7-Span over East side Road grade separation. In general most of the studied alternatives showed a loss in performance. No single alternative was found to best meet all the stakeholders' interests. Further study will be needed to select an alternative that satisfies the majority of stakeholders' project requirements.

Risk Assessment

The results from the Risk Assessment highlighted that there were only minor differences in the risk profiles associated with each Hopland Bypass alternative and that most of these alternatives offered a slight risk improvement over the Baseline. The top four risk events across all Hopland Bypass alternatives were found to be

- External Risk factors from possible program changes due to political factors
- Program Management risk factors if funding is reduced, delayed or stretched over longer periods
- Technical risk factors due to unstable geological conditions, geography of the Russian River floodplain that may compound structural design, potential environmental issues and the impact to many project interdependencies if designs change.
- External Risk factors due to lack of stakeholder consensus.

The objective of the VA study was to establish or validate the Hopland project's functional requirements and offer a set of solutions that optimizes the resources. The results from the VA study may help the Project Development Team (PDT), but they do not supplant their role as the final decision makers on the project scope.